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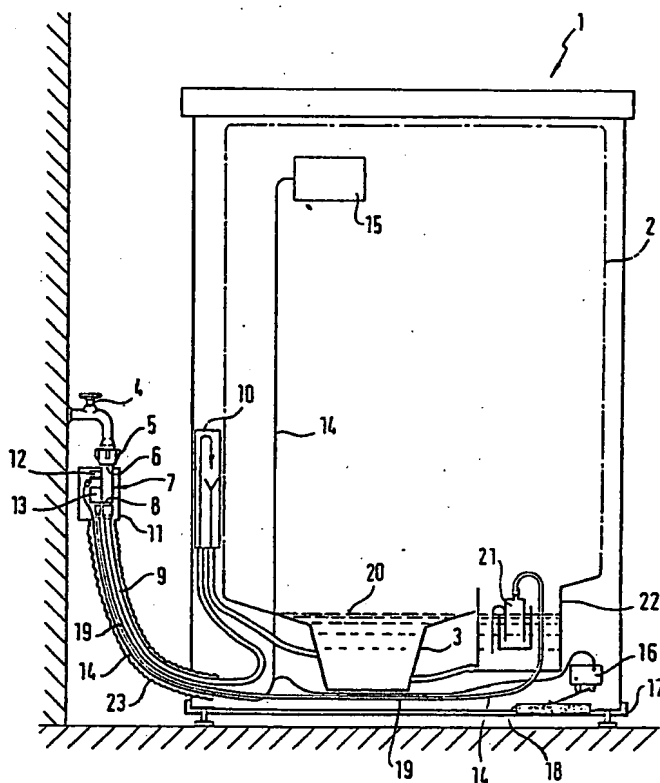
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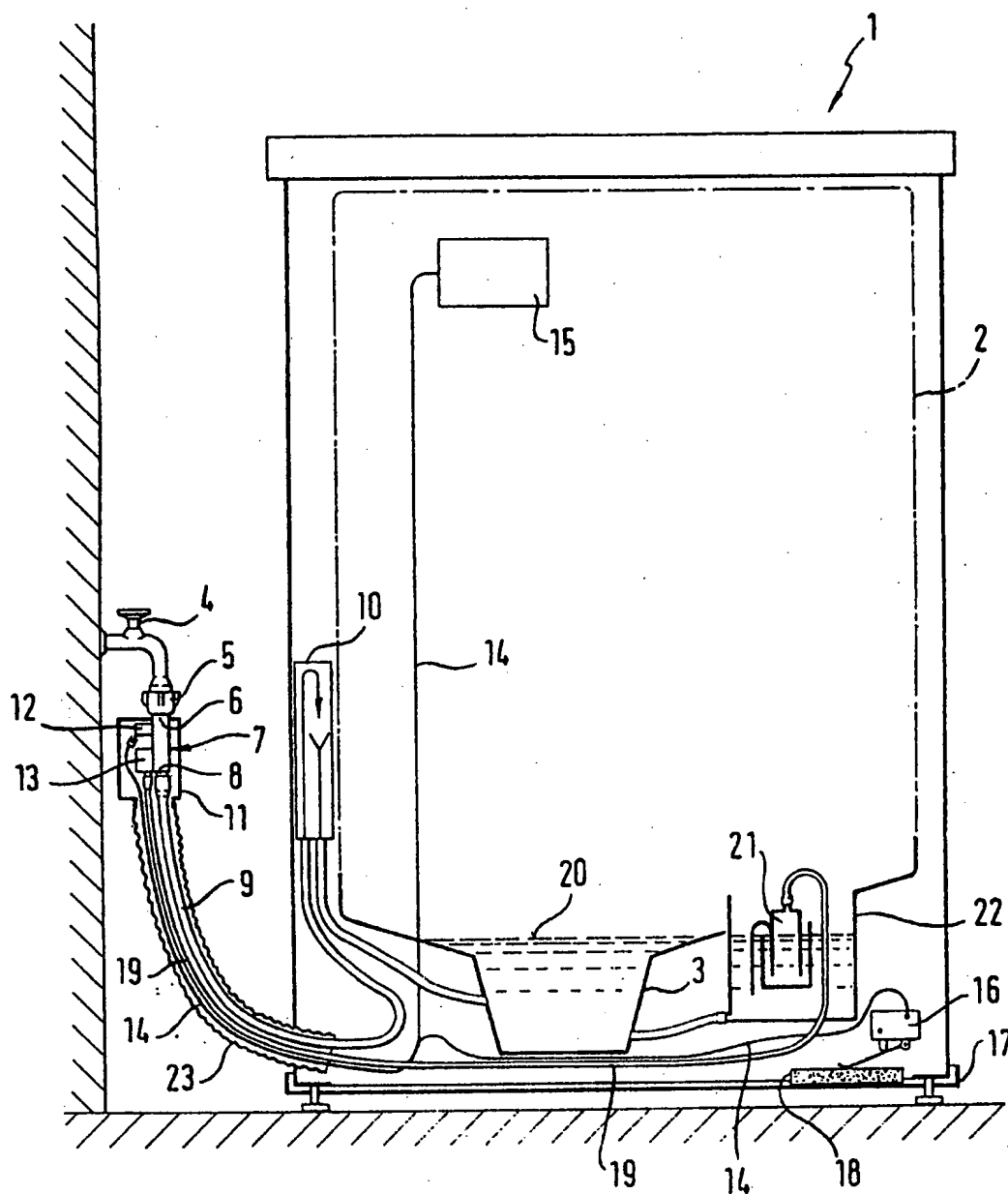
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(54) Water inflow control in an appliance operable with water

(57) A household appliance, such as a dishwashing machine (1), has an inlet hose (9) which is connected by way of a machine-controlled electromagnetic inlet valve (12) to a mains stop cock (4), the valve being controllable by a program control device of the machine. A mechanically actuatable stop valve (13) is arranged in series with the inlet valve (12) at the stop cock (4) and is held in an open rest state by a permanent magnet, a spring or the like. The stop valve (13) is closable by a pressure element which is connected by way of a duct (19) to a water level responsive pressure generating chamber (21) of the machine, of a level-regulating vessel (22). The inlet hose (9) opens free of valve means into an inlet (10) of the machine, and may be surrounded by a leakage water hose 23 leading to a collecting trough 17. A float 18 may be provided which is actuable by leakage water to open switch 16, thus closing inlet valve 12.



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SPECIFICATION

Water inflow control in an appliance operable with water

5 The present invention relates to an appliance operable with water and has particular reference to water inflow control in such an appliance.

In a known safety device for securing against flooding in a liquid-conducting household appliance 10 (DE—PS 30 14 427), water supply is by way of a water mains with a locally fixed stop cock, at which is arranged an electromagnetic inflow valve controlled by a program switching mechanism of the appliance. Extending from the inflow valve is an 15 inflow hose which leads to an inlet part arranged at a rinsing container of the appliance and serving to prevent liquid from being sucked back. Also extending from the inflow valve is a leakage water hose which receives the inflow hose and opens 20 freely into a leakage water collecting trough. Moreover, an electrical connecting line connecting the magnet coil of the inflow valve with the program control device of the machine extends within the leakage water hose or in a separate chamber 25 externally formed on the hose. Any leakage water issuing from the inflow hose when damaged is received by the leakage water hose and conducted into the collecting trough at the bottom of the appliance. Sitting in this trough is a switching device 30 with a float which is raised by such leakage water and actuates a switch which effects the closing of the inflow valve. Provided at the appliance end of the inflow hose, which is constructed to be pressure-resistant, is a mechanical stop valve which 35 is actuable by the float. When the trough is free of leakage water, a magnet holds a diaphragm of the stop valve in the open setting so that water inflow into the rinsing container is not hindered. On the occurrence of leakage water in the trough, the float 40 brings the stop valve into the closed setting. As a result, the supply of liquid to the appliance is interrupted in the event of a fault in the inflow valve or on failure of the current supply to the appliance, the inflow hose, however, remaining under mains 45 water pressure.

Moreover, a safety device for water-conducting household appliances is known (DE—PS 31 14 664), which has a stop valve connected in series with the water inflow valve of the appliance, the influencing 50 of the stop valve being by way of a float-actuated permanent magnet arranged externally of the valve housing. Arranged at the valve housing of this double valve at the appliance end is a pressure element which detects the liquid level in the rinsing 55 container and a diaphragm of which at one side carries a permanent magnet and at the other side is coupled with a float at least directly in such a manner that the float deflects the diaphragm on the occurrence of leakage water in a collecting trough at 60 the bottom of the appliance. The water inflow into the rinsing container of the appliance takes place through opening of an electromagnetically controlled inflow valve of the appliance and switched by the appliance control. On reaching the 65 operating level in the rinsing container, an operating

level monitor effects closing of the electromagnetic inflow valve. On failure of the level monitor or non-closing of the inflow valve, the liquid level in the rinsing container reaches the so-called safety level, 70 at which the diaphragm of the pressure element standing indirectly under the pressure of the liquid raises a permanent magnet so far from its armature in the valve housing that the stop valve actuable by permanent magnet blocks the further inflow of 75 water at the appliance end. In this device, the inflow hose stands constantly under mains pressure when the stop cock is opened.

There is thus a need for safety measures in a water-conducting household appliance to, for 80 example, take over the level filling as well as monitoring, form an effective protection against hose rupture and keep the inflow hose free of pressure outside the filling program steps.

According to the present invention there is 85 provided a household appliance operable with water and comprising an inlet hose communicating at one end thereof and free of valve means with inlet means of the machine, a valve unit connected to the 90 other end of the hose and connectible to a water source, the valve unit comprising an electromagnetic inlet valve controllable by control means of the machine and a stop valve connected in 95 series with the inlet valve and arranged to be held open in a rest state thereof, valve closure means actuable by pressure to close the stop valve, pressure generating means responsive to filling of a 100 water container of the appliance to a predetermined level to generate a pressure, and a duct so connecting the pressure generating means to the valve closure means as to cause such generated pressure to be applied to the closure means for 105 actuation thereof.

An appliance embodying the invention may have the advantage of simplicity provided by use of an 110 electromagnetic inlet valve, which can sit at a stop cock and be controlled by a program switching mechanism of the appliance, to control the filling-up to level of the container and, except for the water-filling portions predetermined in the program of the appliance, to block the water inflow directly at the 115 stop cock and thereby protect the inlet hose from rupture. The stop valve, which is arranged in series with the electromagnetic inlet valve also at such a stop cock of a water mains, operates free of current by way of a pressure-generating means and is 120 therefore effective even in the case of current failure or if the appliance is switched off. The closure means can comprise a pressure element, which is connected by way of a duct with a pressure chamber of a level-regulating vessel belonging to the 125 appliance and which responds on attainment of the safety level in the container and brings the stop valve into the closed position. Since the inlet hose is free of pressure with inlet valve closed as with stop valve closed, bursting of the inlet hose is almost excluded.

Preferably the appliance is equipped with a leakage water collecting trough arranged at the 130 bottom and an associated switching device. Complete monitoring of the inlet hose may be

achieved if a leakage water hose, which envelops the inflow hose and opens freely into the trough, extends from the inlet valve and stop valve unit and if the switching device, which is actuable by a float in the trough, is connected with an electrical control line to the magnet coil of the inlet valve. If the inlet hose were to become leaky during a filling program step, then the water issuing from the inlet hose would be taken up by the leakage water hose and conducted into the trough, where the switching device would promptly initiate the closing of the inlet valve at the stop cock. A leakage within the machine or failure of the mechanical stop valve monitoring the safety level would also not lead to a flooding of the appliance installation space. A further protection results from the fact that the electromagnetic inlet valve is closed in the current-free state.

Preferably, the valve unit is arranged in a closed housing with an inlet connection and an outlet connection, and the leakage water hose additionally surrounds the duct.

An embodiment of the present invention will now be more particularly described by way of example with reference to the accompanying drawing, the single figure of which is a schematic sectional elevation of an appliance embodying the invention.

Referring now to the drawing, there is shown a dishwashing machine 1 having a rinsing container 2 and an outlet sump 3 arranged at the bottom of the container. The water supply to the dishwashing machine takes place from a water mains with a locally fixed stop cock, at which the inlet stub pipe 6 of an inlet valve and stop valve unit 7 is fastened by means of a box nut 5. An inlet hose 9 leads from an outlet stub pipe 8 of the unit 7 to the machine and by way of a water inlet vessel 10 to the rinsing container 2. Disposed in a common housing 11 of the unit 7 is an electromagnetic inlet valve 12, which is arranged directly downstream of the stop cock 4, and a mechanically actuable stop valve 13 which is arranged in a series downstream of the valve 12 and is open in the rest position.

The valves 12 and 13 preferably form a constructional unit with the stub pipes 6 and 8 according to DE-PS 31 14 664. The magnet coil of the valve 12 is connected by an electrical control line 14 with the electric system of the machine and is controllable by its program control device 15. Also connected to the control line 14 of the valve 12 is a switching device 16, which is disposed in a leakage water collecting trough 17 arranged at the bottom in the machine 1 and which, on the occurrence of leakage water, effects closing of the valve 12. In that case, a float 18 can be elevated by rising leakage water to open a switch 16 in the current circuit of the magnet coil of the valve 12 so that this closes in the current-free state.

The mechanically actuable stop valve 13 has a pressure element which is connected in air-tight manner by way of a duct 19 to a pressure chamber 21, set to a safety level 20 of the rinsing container, of a level-regulating vessel 22. In the rest position, the

stop valve 13 is held in the open position, for example through a permanent magnet acting on a diaphragm of the pressure element, a spring or the like. When the filling level of the container 2 reaches the safety level 20, then the pressure acting by way of the pressure chamber 21 and the duct 19 on the pressure element closes the stop valve 13 and stops the further inflow of water to the rinsing container.

Although the hose 9 is free of pressure outside the water-filling steps, with closed inlet valve 12 and/or closed stop valve 13, a further safety measure is provided in the form of a leakage water hose 23 which extends from the housing 11 of the unit 7, envelops the inlet hose and opens freely into the trough 17. The duct 19 and the control line 14 can also be conducted in the leakage water hose 23 or at the hose 23, for example, in a chamber formed externally on the hose.

CLAIMS

1. A household appliance operable with water and comprising an inlet hose communicating at one end thereof and free of valve means with inlet means of the machine, a valve unit connected to the other end of the hose and connectible to a water source, the valve unit comprising an electromagnetic inlet valve controllable by control means of the machine and a stop valve connected in series with the inlet valve and arranged to be held open in a rest state thereof, valve closure means actuable by pressure to close the stop valve, pressure generating means responsive to filling of a water container of the appliance to a predetermined level to generate a pressure, and a duct so connecting the pressure generating means to the valve closure means as to cause such generated pressure to be applied to the closure means for actuation thereof.

2. An appliance as claimed in claim 1, the pressure generating means comprising a pressure chamber of a water level regulating vessel.

3. An appliance as claimed in either claim 1 or claim 2, comprising a trough arranged at the base of the appliance to collect leakage water, a leakage water hose surrounding a length portion of the inlet hose and extending from the valve unit to open freely into the trough, and a switching device actuable by a float in the trough to cause the inlet valve to close.

4. An appliance as claimed in claim 3, wherein the valve unit is arranged in a closed housing with an inlet connection and an outlet connection, and the leakage water hose additionally surrounds the duct.

5. An appliance as claimed in either claim 3 or claim 4, wherein the inlet valve is connected to the control means by an electrical lead extending through or at the leakage water hose.

6. An appliance as claimed in any one of the preceding claims, the appliance being a dishwashing machine or a laundry washing machine.

7. An appliance substantially as hereinbefore described with reference to the accompanying drawing.